III. REMARKS

The specification has been amended to address minor typographical errors.

Claims 1-10 have been amended and new claims 11-26 have been added. Specifically, claims 1-10 have been amended to improve grammar, spelling, and to remove superfluous character references, which has no further limiting effect on the scope of these claims.

Claims 1 and 2 have been additionally amended to recite a "first spectrum matrix [S]" and a "second spectrum matrix [I]" as supported on page 17, lines 1-8, of Applicants' specification as originally filed. Claims 3-10 have been additionally amended to recite a "two-dimensional distribution matrix [P]" as supported on page 17, lines 1-3, of Applicants' specification as originally filed. Claim 6 has been additionally amended to recite a "two-dimensional distribution matrix [I] of light absorbency of the object" and a "pre-measured spectrum matrix [S] of light absorbency of a target" as supported on page 17, lines 1-8, of Applicants' specification as originally filed.

New claim 11 depends upon claim 1 and additionally recites "wherein determination of the presence or absence of the target component is performed without opening the object" as supported on page 4, lines 4-9, of Applicants' specification as originally filed.

New independent claim 12 corresponds to present claim 1, but is written without "step-plus-function" language so that claim 12 will not invoke 35 U.S.C. § 112, sixth paragraph. Thus, new independent claim 12 is broader in scope than independent claim 1. New claim 13 depends upon claim 12, and additionally recites subject matter from claims 2-4. New claim 14 depends upon claim 13, and additionally recites subject matter corresponding to that of claim 5. New claim 15 depends upon claim 12, and additionally recites "wherein determination of the presence or absence of the target component is

performed without opening the object" as supported on page 4, lines 4-9, of Applicants' specification as originally filed.

New claim 16 depends upon claim 6, and additionally recites "wherein tera-hertz waves of N number of different wavelengths are used for M number of targets, N being equal to or larger than M, wherein the target density calculation device calculates the two-dimensional distribution matrix [P] as follows: when N is equal to M, the two-dimensional distribution matrix [P] of the target density is calculated by $[P] = [S]^{-1}[I]$, and when N is larger than M, the two-dimensional distribution matrix [P] of the target density is calculated by $[I] = [S][P]$, using a least square method" as supported by original claim 5 and as supported on page 13, lines 4-9, and on page 17, lines 1-8, of Applicants' specification as originally filed.

New claims 17 depends upon claim 6, and additionally recites "wherein the target density calculation device determines a presence or absence of a target component in the object using the calculated two-dimensional distribution matrix [P] and without opening the object" as supported on page 14, lines 4-11, and on page 21, line 23, to page 22, line 1, of Applicants' specification as originally filed.

New claims 18, 21 and 24 depend on claims 1, 12 and 6, respectively, and additionally recite "wherein the object is an article that is capable of containing the target component" as supported on page 4, lines 4-9, of Applicants' specification as originally filed. New claims 19, 22 and 25 depend on claims 18, 21 and 24, respectively, and additionally recite "wherein the article is selected from the group consisting of an envelope, a parcel and a container" as supported on page 21, lines 20-22, of Applicants' specification as originally filed. New claims 20, 23 and 26 depend on claims 18, 21 and 24, respectively, and additionally recite "wherein the target component is selected from the group consisting of a

drug and bio-powder" as supported on page 3, lines 22-24, and on page 13, lines 21-24, of Applicants' specification as originally filed.

The present amendment adds no new matter to the above-captioned application.

A. The Invention

The present invention pertains broadly to a method of, and apparatus for, inspecting a target by tera-hertz wave spectroscopic measurement such as may be used to detect particular targets, for example, drugs or bioweapons, that are contained in an object, for example, an envelope. In accordance with a method embodiment of the present invention, a method of inspecting a target by tera-hertz wave spectroscopic measurement is provided that includes the steps recited by independent claim 1. In accordance with another method embodiment of the present invention, a method of inspecting a target by tera-hertz wave spectroscopic measurement is provided that includes the steps recited by independent claim 11. In accordance with an apparatus embodiment of the present invention, an apparatus for inspecting a target by tera-hertz wave spectroscopic measurement is provided that includes the features recited by independent claim 6. Various other embodiments, in accordance with the present invention, are recited by the independent claims.

An advantage provided by the method and apparatus embodiments of the present invention is that a target component disposed in an object may be detected without having to open the object to detect the presence or absence of the target component.

B. The Rejections

Claims 1-3, 5, 9 and 10 stand rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

Claims 1-4 and 6-8 stand rejected under 35 U.S.C. § 102(b) as anticipated by Jacobsen et al. (U.S. Patent 5,939,721, hereafter the "Jacobsen Patent").

Claims 5, 9 and 10 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the Jacobsen Patent in view of Sharaf (U.S. Patent 6,015,667, hereafter the "Sharaf Patent").

Applicants respectfully traverse the Examiner's rejections and request reconsideration of the above-captioned application for the following reasons.

C. Applicants' Arguments

Claims 1-17 are in compliance with 35 U.S.C. § 101 for the following reasons. Claims 4 and 6-8 plainly recite statutory subject matter covered under Section 101. Claims 1-3, 5, 9 and 10 also recite statutory subject matter, in compliance with Section 101, because independent claim 1 relates to a process or method having physical steps. Specifically, independent claim 1 recites "pre-measuring a first spectrum matrix [S] of tera-hertz wave absorbencies of a target component for a plurality of frequencies ranging from about 1 THz to 3 THz." This is a physical step wherein a spectrum of tera-hertz wave absorbencies of a target component are measured. Independent claim 1 additionally recites "irradiating an object with tera-hertz waves...." This is another physical step, wherein an object is irradiated with tera-hertz waves.

In sum, because independent claim 1 recites two physical acts or steps that are performed as part of the method, independent claim 1 recites a statutory method covered under 35 U.S.C. § 101. In other words, the Examiner has failed to establish a prima facie case that claim 1 pertains to nonstatutory subject matter.

The Examiner contends that "the claims are directed to a judicial exception [to Section 101 and]...must have either a physical transformation and/or a useful, concrete and tangible result" (Office Action, dated April 2, 2007, at 2, lines 18-20). As discussed above,

the Examiner's contention is flawed because independent claim 1 recites a method including physical acts and, therefore, falls squarely within the statutory subject matter covered under Section 101. See AT&T Corp. v. Excel Communications Inc., 50 U.S.P.Q.2d 1447, 1453 (Fed. Cir. 1999).

Assuming, *arguendo*, independent claim 1 recites solely a mathematical algorithm as the Examiner contends (which, as discussed above, is an invalid assumption), the method of claim 1 recites a "useful, concrete and tangible result" falling within the "judicial exception" of State Street Bank & Trust v. Signature Financial Group, 47 U.S.P.Q. 2d 1596, 1601 (Fed. Cir. 1998). In this case, independent claim 1 recites

> determining presence or absence of the target component in the object on the basis of the first spectrum matrix [S] of tera-hertz wave absorbencies and a second spectrum matrix [I] of tera-hertz wave absorbencies of the object."

"Determining presence or absence of the target component in the object" is a "useful, concrete and tangible result." Thus, even if independent claim 1 did not recite its two physical steps, it would still fall within a "judicial exception" because the claim provides detection of the presence or absence of a target in an object.

For all of the above reasons, claims 1-17 recite statutory subject matter in compliance with 35 U.S.C. § 101.

i. The Section 102(b) Rejection

Anticipation under 35 U.S.C. § 102 requires showing the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim. Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick, 221 U.S.P.Q. 481, 485 (Fed. Cir. 1984). In this case, the Examiner has not established a prima facie case of anticipation against Applicants' claimed invention because the Jacobsen Patent does not teach, or suggest, each and every element of the claimed invention.

ii. The Jacobsen Patent

The Jacobsen Patent discloses "systems and methods for processing and analyzing terahertz waveforms," wherein a time-domain signal processing system for displaying, classifying, and recognizing temporal and spectral features in terahertz waveforms returned from materials is employed to classify and analyze free induction decay exhibited by gases excited by far-infrared (terahertz) pulses (See Abstract of the Jacobsen Patent). In particular, the Jacobsen Patent discloses that a simple geometric picture may be used for the classification of the waveforms measured for unknown gas species and gas mixtures (See Abstract).

The Jacobsen Patent does not teach, or suggest, "determining presence or absence of the target component in the object on the basis of the first spectrum matrix [S] of tera-hertz wave absorbencies and a second spectrum matrix [I] of tera-hertz wave absorbencies of the object" as recited by independent claims 1 and 12. The Jacobsen Patent also does not teach, or suggest, "wherein determination of the presence or absence of the target component is performed without opening the object" as recited by claims 11 and 15, and "the target density calculation device determines a presence or absence of a target component in the object using the calculated two-dimensional distribution matrix [P] and without opening the object" as recited by claim 17.

However, this is not the only deficiency in the disclosure of the Jacobsen Patent. The Jacobsen Patent discloses, as shown in Figure 2B, that the power input wave is continuous from 0 THz to 3 THz. As shown in Figures 3A to 3E, Jacobsen further discloses that the THz waveforms are altered by transmission through a "medium under investigation" (16), such as water vapor, carbon dioxide gas and HCl vapor (col. 5, lines 26-33; col. 5, line 63, to col. 6, line 14, and see also Figure 1). A person of ordinary skill in the art would instantly

understand from Figure 1 of Jacobsen that Jacobsen discloses irradiating a gas (16) with THz radiation to classify and analyze the gas. The Jacobsen Patent does not teach, or even suggest, irradiating the container in which the gas is carried to determine whether on not the gas is present in the container. Thus, the Jacobsen Patent also does not teach, or suggest, "pre-measuring a first spectrum matrix [S] of tera-hertz wave absorbencies of a target component" and "irradiating an object with tera-hertz waves of the plurality of frequencies to measure absorbencies of the object" in combination with "determining presence or absence of the target component in the object" as recited in independent claims 1 and 12.

The Jacobsen Patent also discloses in Figures 3A to 3E that the information about different properties of the gas (16) may be obtained by comparing the frequency-dependent amplitude and phase of both the input and output waveforms that are respectively generated by THz transmitter (20) and detected by THz detector (22). On the other hand, in accordance with the present invention, as shown in Figures 4 and 6A to 6I of the above-captioned application, the tera-hertz waves employed to irradiate the "object" and the tera-hertz waves employed to pre-measure the "first spectrum matrix" are not necessarily continuous and distinct from other tera-hertz waves in the range from 1 to 3 THz.

The Jacobson Patent also does not teach, or suggest, "pre-measuring a first spectrum matrix [S] of tera-hertz wave absorbencies..." as recited in independent claims 1 and 12, and "a spectroscopic measurement device that measures a two-dimensional distribution matrix [I] of light absorbency of the object" as recited by independent claim 6. As shown in Figures 4 and 6A to 6I of the above-captioned application, the present claimed invention utilizes tera-hertz wave absorbency. For example, the absorbency is shown in Figures 6A to 6I by (-ln(I0/I)). From the relation $I = I0\exp(-aL)$, a person of ordinary skill in the art would realize that the absorbency does not depend on the incident intensity I0. Therefore, steady

absorbency may be achieved even if the incident intensity changes or is unstable between from 0 THz to 3 THz.

Figures 7A to 7D of the above-captioned application show density distributions. When collecting data for Figure 4 of the above-captioned application, it was necessary to measure the relationship between absorbency and density for each material. Then, the data shown in Figures 7A to 7D can be prepared from the data in Figure 4 using the measured relationships.

On the other hand, the Jacobsen Patent is silent regarding absorbency, whereas the various embodiments of the present invention utilize absorbency. In fact, in accordance with the various embodiments of the present invention, steady absorbency can be achieved even if the incident intensity is changed or unstable.

As admitted by the Examiner (Office Action, dated April 2, 2007, at 6, lines 18-25), the Jacobson Patent does not teach, or suggest, that "tera-hertz waves of N number of different wavelengths are used for M number of targets, N being equal to or larger than M, wherein...when N is equal to M, the two-dimensional distribution matrix [P] of the target density is calculated by $[P] = [S]^{-1}[I]$, and when N is larger than M, the two-dimensional distribution matrix [P] of the target density is calculated by $[I] = [S][P]$, using a least square method" as recited by claims 5, 9, 10, 14 and 16.

For all of the above reasons, the Examiner has not establish a prima facie case of anticipation against the claims of the above-captioned application.

iii. The Section 103 Rejection

A prima facie case of obviousness requires a showing that the scope and content of the prior art teaches each and every element of the claimed invention, and that the prior art provides some teaching, suggestion or motivation to combine the references to produce the

claimed invention. In re Oetiker, 24 U.S.P.Q.2d 1443 (Fed. Cir. 1992); In re Vaeck, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). In this case, the Examiner has not established a prima facie case of obviousness against Applicants' claims because the combination of the Jacobsen Patent and the Sharaf Patent fails to teach each and every element of the claimed invention.

iv. The Jacobsen Patent

The disclosure of the Jacobsen Patent is discussed above.

v. The Sharaf Patent

The Sharaf Patent discloses a "multicomponent analysis method including the determination of statistical confidence interval," such as may be employed to analyze a spectral response of a mixture comprising a plurality of spectrally resolvable molecular species (See Abstract of the Sharaf Patent). The Sharaf Patent discloses that its method may be applied to the analysis of spectral data such as may be related to UV-Visible absorbance, chemiluminescence, Raman spectroscopy, fluorescence and electrochemiluminescence (col. 5, lines 30-37).

However, the Sharaf Patent does not teach, or suggest, "determining presence or absence of the target component in the object on the basis of the first spectrum matrix [S] of tera-hertz wave absorbencies and a second spectrum matrix [I] of tera-hertz wave absorbencies of the object" as recited by independent claims 1 and 12, and "a spectroscopic measurement device that measures a two-dimensional distribution matrix [I] of light absorbency of the object" as recited by independent claim 6. The Sharaf Patent also does not teach, or suggest, "wherein determination of the presence or absence of the target component is performed without opening the object" as recited by claims 11 and 15, and "the target density calculation device determines a presence or absence of a target component in the

object using the calculated two-dimensional distribution matrix [P] and without opening the object" as recited by claim 17.

vi. Summary of the Disclosures

Neither the Jacobsen Patent nor the Sharaf Patent teach, or suggest, (1) "determining presence or absence of the target component in the object on the basis of the first spectrum matrix [S] of tera-hertz wave absorbencies and a second spectrum matrix [I] of tera-hertz wave absorbencies of the object" as recited by independent claims 1 and 12, (2) "a spectroscopic measurement device that measures a two-dimensional distribution matrix [I] of light absorbency of the object" as recited by independent claim 6, (3) "wherein determination of the presence or absence of the target component is performed without opening the object" as recited by claims 11 and 15, and (4) "the target density calculation device determines a presence or absence of a target component in the object using the calculated two-dimensional distribution matrix [P] and without opening the object" as recited by claim 17. The Jacobsen Patent and the Sharaf Patent, either alone or in combination also do not teach, or suggest, the subject matter recited by new claims 18-26.

For all of the above reasons, the combination of the disclosures of the Jacobsen Patent and the Sharaf Patent cannot render obvious the subject matter of Applicants' claims.

IV. CONCLUSION

The Examiner has not established a prima facie case with respect to the allegation that claims 1-3, 5, 9 and 10 do not recite statutory subject matter under 35 U.S.C. § 101 because the Examiner has failed to consider that these claims recite two physical steps.

The Examiner has also not established either a prima facie case of anticipation, or a prima facie case of obviousness, against Applicants' claimed invention because neither the

Jacobsen Patent nor the Sharaf Patent, either alone or in combination, teach or suggest, (1) "determining presence or absence of the target component in the object on the basis of the first spectrum matrix [S] of tera-hertz wave absorbencies and a second spectrum matrix [I] of tera-hertz wave absorbencies of the object" as recited by independent claims 1 and 12, (2) "a spectroscopic measurement device that measures a two-dimensional distribution matrix [I] of light absorbency of the object" as recited by independent claim 6, (3) "wherein determination of the presence or absence of the target component is performed without opening the object" as recited by claims 11 and 15, and (4) "the target density calculation device determines a presence or absence of a target component in the object using the calculated two-dimensional distribution matrix [P] and without opening the object" as recited by claim 17.

For all of the above reasons, claims 1-26 are in condition for allowance and a prompt notice of allowance is earnestly solicited.

Questions are welcomed by the below-signed attorney for Applicants.

Respectfully submitted,

GRIFFIN & SZIPL, P.C.

Reg #47,395

for Joerg-Uwe Szipl
Registration No. 31,799

GRIFFIN & SZIPL, P.C.
Suite PH-1
2300 Ninth Street, South
Arlington, VA 22204

Telephone: (703) 979-5700
Facsimile: (703) 979-7429
Email: gands@szipl.com
Customer No.: 24203